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ABSTRACT

Research was conducted to test six hypotheses about the social effectiveness of mainstreaming orthopedically handicapped children. Data were collected on the network structures of the social relationships among handicapped and nonhandicapped children in first, third, and sixth grade classrooms. The three samples of children used in the study included nonhandicapped, nonmainstreamed children; handicapped and nonhandicapped children in mainstreamed classrooms; and handicapped, nonmainstreamed children. Children in all three samples were asked questions about how much they played with handicapped and nonhandicapped children both at school and at home. Pictures were taken of each child in the selected mainstreamed classrooms, and the children in these classrooms were shown the pictures of their classmates and asked how often they talked to or played with the pictured child. Only one of the six hypotheses was supported, indicating that orthopedically handicapped children were less integrated into overall communication networks. Those children who were mainstreamed did have more contact with peers outside of school than those who were not mainstreamed. The network analysis procedure appeared to be an accurate index of communication patterns, and the use of photographs in the process increased reliability and children's willingness to participate. (RL)

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# COMMUNICATION BETWEEN HANDICAPPED AND NONHANDICAPPED CHILDREN: A NETWORK ANALYSIS OF A MAINSTREAMING PROGRAM[1]

by

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Traditionally, an important goal of special education has been to integrate handicapped children into regular public school classes whenever it is appropriate (McCauley, Bruininks and Kennedy, 1976). The passage of PL 94-142 has facilitated the efforts of special education teachers to do this. The impetus for mainstreaming has come from several directions; economic, academic and social factors have all been key considerations. Most importantly, the goals of mainstreaming are the realization of a child's personal worth and the ability to communicate effectively with others (Newberger, 1978). The study reported herein is a partial investigation of the social effectiveness of one mainstreaming program utilizing a more sophisticated data analytic technique than is usually incorporated by such research.

Avoidance and Communication Patterns

Both handicapped children and adults are avoided by nonhandicapped others and are stigmatized because of their disabilities. Research on adult handicapped-nonhandicapped interactions has shown that the handicapped are frequently judged as totally inferior (Goffman, 1963; Wright, 1960). Farina and his colleagues (1966,1965, 1968) have determined that the stigmatized are blamed for nonexistent failings, are perceived as less well adjusted, are perceived as poorer workers, and are held responsible for any team mistakes made when working with a "normal." There is also evidence that the handicapped are perceived as more reserved, closed and defensive than the nonhandicapped (Wright, 1960) and as more alienated and introverted (Titley, 1969).

Avoidance of the handicapped is manifest in many ways. Interactions with a handicapped person tend to be shorter than interactions between two nonhandicapped individuals (Farina, Sherman and Allen, 1968; Kleck et al., 1966), and "normals" maintain greater interpersonal distance when interacting

with a handicapped person (Kleck et al., 1966; Kleck, 1968; Kleck, 1969). Apparently, anticipation of an interaction with a handicapped person arouses anxiety which causes many nonhandicapped persons to try to avoid such interactions (Farina, Holland and Ring, 1965; Farina and Ring, 1968).

In addition to this avoidance response, the communicative behavior directed by the nonhandicapped toward the disabled is characterized by other cues exemplifying uncertainty and discomfort. Kleck (1968, 1969) found that "normals" exhibit more constrained behavior during mixed interactions and consistently show less movement and variability during interactions with the handicapped (Kleck et al., 1966). Moreover, electrical shocks given to a severely handicapped individual are longer and more intense than those given to individuals who are less handicapped (Farina, Sherman and Allen, 1967).

Studies of handicapped children have also consistently shown an avoidance response. These findings have been replicated with many different disability groups. Studies of educable mentally retarded children (EMR) in mainstreamed classrooms have reported that they are not included in communication networks and interaction patterns (Baldwin, 1958; Goodwin, Gottlieb and Harrison, 1972; Johnson, 1950, 1951; Johnson and Dirk, 1950; and Rucker, Hower and Snider, 1969). This is true even when the children are receiving special help from the resource room to facilitate academic development (Iano, Ayers, Heller, McGettigan and Walker, 1974). Lapp (1957) was able to conclude that EMR kids in an integrated setting are tolerated, but are certainly not sought out for interactions. Generally, these children tended to be rather passive. And in Miller's (1956) study EMR kids were mildly accepted, but not as integrated as average intelligence children.

Mainstreamed hearing impaired children seemed to be more accepted than some previous research has reported, and are as perceptive as normal peers in estimating their status (McCauley, Bruininks and Kennedy, 1976). Most of their interactions, however, tend to be nonverbal and are more likely to be directed toward the teacher than toward fellow students.

Bryan (1974) examined the social acceptance of learning disabled (LD) students in regular classes and concluded that the children were not well accepted. This finding was replicated in his 1976 followup investigation (Bryan, 1976). Bruininks (1978) also concluded that LD students are less accepted by their nonhandicapped peers, and that the LD children are less accurate in assessing their personal status.

In a study exemplified by the great degree of contact experienced by the groups of children, Richards, Ronald and Fleck (1974) reported that the visibly handicapped child is still the least preferred possible playmate. This group is followed by the nonvisibly handicapped, and then by the nonhandicapped. These children had been living together in a summer camp for several weeks prior to data collection. Center & Center (1963) also determined that the physically handicapped child is less preferred as a friend. One of the few studies contradicting this finding was one conducted by Macy and Carter (1978) which concluded that EMR, TMR, emotionally disturbed (ED), and minimally brain injured (MBI) children were well adjusted to the mainstreamed setting and socially integrated. These findings, however, were generated from teachers ratings, not from observations of the students or from the student's perceptions.

Even with preschool children, the handicapped are still likely to be rejected (Cooke, Apolloni and Cooke, 1977; Devoney, Guralnick and Rubin, 1974; Guralnick, 1976; Snyder, Apolloni and Cooke, 1977). Being in an integrated

preschool does seem to help in the development of social participation in handicapped children, but they remain lower in this than their nonhandicapped peers (Wilton and Densem, 1977).

Social Effects of Mainstreaming

Many writers have suggested that the decreased contact experienced by handicapped children and adults may result in fewer opportunities to develop the social skills and interpersonal sensitivity necessary for effective interaction with others (Kelley et al., 1960; Kleck et al., 1966). Since the handicapped experience little contact, and that contact tends to be distorted, they do not receive an appropriate model of behavior and sensitivity. Kitano et al. (1978) suggested that the handicapped may be unable to develop the role taking skills necessary for communicative competence (Bochner and Kelly, 1974).

Research does point to the importance of peer interactions for the development of effective social or interpersonal skills. Lewis and Rosenblum (1975) determined that peer relationships may be as important in a child's development and learning as associations with important adults. Hartup (1978) concluded that interactions with peers provide an important opportunity for children to develop social skills. While it has often been assumed that familial relations are the most important determinant of social competence, Hartup's findings suggest that peer interactions are equally important.

Additional research (Eckerman, Whatley, and Kutz, 1975; Whiting and Whiting, 1975; Rosenthal, 1967) has concluded that peer interactions are qualitatively different from parent-child interactions, and that they play a distinctively significant role in the development of social skills. It is these peer interactions which are limited for most handicapped children. Indeed, Richardson et al. (1974), in their summer camp study, suggested that the

handicapped children were disliked in part because of their deficient social skills. Although their analysis of this data was only cursory, it did suggest that this may be a contributing factor. Other research has posited a direct relationship between a child's peer status and his or her academic achievement. Thompson (1980) concluded that physically handicapped children are deficient in perspective taking skills, but that mainstreaming seems to help this somewhat.

There is some indication that a handicap may also have negative effects on a child's self image and self esteem (Meissner, Thoreson and Butler, 1967; Wright, 1960; Goffman, 1963). Budoff and Gottlieb (1974), however, report more positive self images as a function of mainstreaming in EMR children.

Much of the research pertaining specifically to attitudes toward the handicapped must be accepted only tentatively, because of the social desirability inherent in such self-reports. One study of mainstreaming, however, indicated that integration made attitudes more positive, and the handicapped were then perceived as more independent and able to care for themselves--a significant breakthrough. The sex differences that had existed in the attitudes prior to mainstreaming disappeared, while integration tended to increase the attitudinal differences between younger and older children (Rapier et al., 1972).

Most of the above studies utilized sociometric procedures to assess interaction patterns. Typically, the children are asked to list their three most preferred playmates. Sociometric diagrams of friendship patterns are then constructed. This type of procedure yields interesting information about best friends within the classes, but that is all. The information provided about relationships of handicapped children is limited if they are not in the top three. Alternatively, there are procedures available which allow examination of

links or relationships between each child and every other child. Such procedures are, then, more powerful. Network analysis is one such procedure.

Network Analysis

To measure the interaction patterns of mainstreamed children, a network analysis was utilized. Network analysis attempts to ascertain, essentially, who talks to whom and how often. It describes all of the possible communication links within a given system. To do this, all members within a system are asked to report who they talk to, how often they talk to them, the duration of the communication, and the context in which the talk occurs (task-related, socially, etc.).

In past research, communication networks have been measured in several different ways. One method has been to use in-depth interviews, asking subjects to whom they talk, etc. (Bott, 1971). A second method has been to use questionnaires, where participants supply the relevant information themselves (Jacobsen and Seashore, 1951). A more difficult and time consuming technique, although perhaps of more validity, has been the use of diaries. Participants are asked to record every verbal interaction they have with another member of the system (Conrath, 1973). This method, of course, results in additional difficulties because participants often forget to record many interactions and end up improvising later. Some other methods utilized to ascertain communication networks have been unobtrusive measurement techniques and observation. The members of a system may be observed; the aim is to record all interactions. This may be done by someone who is not normally a part of the system, possibly resulting in some experimental bias. Or it may be done by someone who is normally part of the system and is, therefore, able to observe and record the interactions without the other members' awareness. This method

may provide high validity, if the system is small enough for the observer to see all possible interactions. However, this requirement is very difficult to fulfill, making this method somewhat impractical.

## Important Aspects of Network Analysis

The components of the network are called nodes. Each student in the classroom and the teacher and aides, then, are the nodes of the network. The relationship between any pair of nodes is called a link. When self report measures are used, the links reported may be asymmetric. One person may report that he or she did talk to another person, while the second person may not report having talked to the first. There are, therefore, two links for every pair of nodes. The researcher may also be interested in ascertaining the strength of a link, as did Phillips and Conviser (1972), or may allow respondents to maintain different types of links, in the manner described by Jacobsen and Seashore (1951).

The goal of most network procedures is to describe the underlying social structure of a system. The most common way of doing this is by dividing the system into groups or cliques. A clique is a group of highly associated nodes. In addition, information about each node is obtained through a network analysis. This includes the role of the node and the degree of structure with which a node is bound to the system.

Numerous different analytic techniques have been used to understand networks. The most common techniques have been factor analysis, cluster analysis, and multi-dimensional scaling. Because the goal of the present study is to ascertain a great deal of information about each node, Richards (1975) clustering procedure will be used. His program, NEGOPY, allows a great deal of

adaptation to the individual user. In addition to the detailed information provided, cliques are first identified and are then subjected to a series of formal criterion tests. The program also measures the density of the cliques, the integrativeness of nodes, and liaisons or bridges between cliques.

Procedures for Network Analysis

The network structure of the classrooms to be measured in the present study will be ascertained through the use of verbally administered questionnaires. Pictures will be taken of each child within the classroom. These pictures will then be attached to a questionnaire, and the children will be asked how often they talk to or play with the child in the picture. Previous research has suggested the use of pictures for research using children, as the children do not have to rely on their memory of names, etc. (Farace, Monge and Russell, 1975). This procedure also increases children's willingness to participate in the research if they are promised that they will receive their own picture after they bring back a permission slip with a parent's signature.

The data obtained from the questionnaires will enable us to make comparisons between the social networks of handicapped and nonhandicapped children. Of interest will be the differences in the integrativeness of the two groups of children, the inter-mixing of the groups in cliques, and the amount of communication between the groups. This will provide a measure of the interaction patterns between handicapped and nonhandicapped children and enable us to ascertain whether the handicapped are avoided in the classrooms.

Network analysis will prove useful only within mainstreamed classrooms, since there will be no mixed contact within nonmainstreamed classrooms. To determine the amount of mixed contact of nonmainstreamed children, a second

questionnaire will be administered. This questionnaire will ask all of the children (mainstreamed and nonmainstreamed, handicapped and nonhandicapped) how many handicapped children and how many nonhandicapped children they play with outside of school.

Finally, we will attempt a developmental investigation of the processes described above. Since we assume that children are not born with prejudices toward the handicapped, it is appropriate to ask how these attitudes develop. There is some evidence that these behaviors begin to appear around age four (Jones and Siska, 1967). McDaniels (1969) determined that, while ten year olds have fully developed discrimination systems, overall, attitudes toward the handicapped become more positive as a function of maturity. And Rapier et al., (1972) concluded that children develop a more realistic attitude toward the handicapped as a function of age. In light of these findings, the present study will measure children in grades 1, 3 and 6. The following hypotheses will be tested:

H1: The mainstreamed children will be more likely to participate in mixed contact outside the classroom than will nonmainstreamed children.

H2: Within mainstreamed classrooms, the handicapped children will be less integrated into the social structure than will nonhandicapped children.

H3: Within the mainstreamed classrooms, most cliques will be composed of either handicapped or nonhandicapped children. There will not be much mixing between the groups of children.

H4: Handicapped children will be less likely to occupy liaison roles or participate in cliques than will nonhandicapped children.

H5: Integration scores will increase as a function of age.

H6: The differences between mainstreamed and nonmainstreamed children on mixed contact will become greater as a function of age.

## METHODS

### Subjects

The participants were all students in the _____ County School District in the State of _____. Since the state is a small one, this district constitutes well over one half of school age children in the state.

The county-wide school district was, up until nine months prior to data collection, five separate school districts--one city and four suburban districts. In September of 1978 a court ordered busing program was instituted. First through third grades, junior high and high school students from the city are bused into the suburbs, while fourth through sixth graders are bused into the city. Although protests preceeded the busing program there was little violence once it began. Any violence was confined to occasional fist fights, primarily on the buses.

Consistent with the guidelines of PL 94-142, the district is attempting to provide the least restrictive environment for each child. Beginning in September, 1978, several children were mainstreamed from the special school into one of several "regular" schools. Most of the elementary age children were mainstreamed into one suburban school.

Subjects for the current study were selected through the use of several criteria. The primary criterion was age. To represent the first grade sample, six and seven year old children were selected. For the third grade sample the ages eight and nine were considered appropriate. Eleven and twelve year olds constituted the sixth grade. Age was considered a more appropriate criterion than grade because many of the handicapped children are not in the grade ordinarily considered appropriate for their age level.

For the nonhandicapped, nonmainstreamed sample the criteria were appropriate age, not having a known handicap, and being in a nonmainstreamed class. The criteria for the nonhandicapped, mainstreamed group were age, not having a handicap, and being in a class with one or more of the children selected for the handicapped, mainstreamed sample. The criteria for selection of the two handicapped samples were more stringent; the child must be only orthopedically handicapped and have speech skills adequate for understanding, in addition to the age requirement. This limitation was utilized to prevent confounding effects that some other handicaps may have on communication and communication patterns. A physical handicap does not effect the cognitive aspects of communication skills in ways that others may. The handicapped, mainstreamed children had been in a "regular" classroom since Spetember, 1978, although some still utilized a resource room within the school. The handicapped, nonmainstreamed sample was in a self-contained classroom in a special school all day.

Children were selected by going through the roster of students. All eligibile handicapped students were selected. Nonhandicapped, nonmainstreamed classes were randomly selected. The desired sample size for each cell was 25, although there were not enough handicapped students fulfilling the other requirements to obtain this sample size. All eligible handicapped students whose parents would give their permission were included.

Procedures

The data were collected in the schools, during the school day, on an individual basis. Children were scheduled at some time during the school day that did not interfere with their school work or activities. Interviews were conducted in any vacant room -- usually an audio visual room or something

similar sufficed. The rooms contained a table and two chairs.

The first phase of data collection was the General Information Sheet. The experimenter filled out most of the form privately, asking subjects only for birth dates. The birth dates were later verified by school records. The questionnaire asked for information about school, teacher handicaps, sex, race, wheelchairs, speech skills, physical attractiveness, and degree of physical disability. The absence or presence of a handicap was also verified by school officials. The form could be filled out after the session, if necessary. Speech skills, physical attractiveness and degree of disability were subjectively estimated by the experimenters on five-point ordinal scales.

To make sure that the children were only physically handicapped a brief intelligence test was given. The Slosson Intelligence Test, 1971 edition, was used for this purpose. Reliability for this measure was .97 (Slosson, 1971), and correlations with the Stanford-Binet test, Form L-M, range from r=.90 to .98. The test was administered orally and took about 10 to 15 minutes.

All children were asked questions from the Activity Questionnaire. This asked for information about how much the child played with handicapped and nonhandicapped children both at school and at home. It also asked two open-ended questions: "Do you like handicapped kids?" and "Do you think you could play with handicapped kids?"

All children in the mainstreamed classes were included in the network analysis. This measure is designed to determine who plays with whom in the classes. Snapshots were taken of every child in the class with an instant developing camera. Each individual subject was then shown a snapshot of every other child in the class and asked, for each picture, "Do you know this child's

name?" "How much do you play with him/her at school?" "How much do you play with him/her at home?" and "How much do you like this child?" Responses to questions two, three and four were given on a four point scale represented by "a lot -- sometimes -- a little -- not at all." This took about 20 minutes per subject.

Data Analysis

The key variables were analyzed by a series of 2 x 2 x 3 factorial analyses of variance. The factors included two levels of class (mainstreamed and nonmainstreamed), two levels of handicap (handicapped and nonhandicapped), and three levels of grade (first, third, and sixth). Prior to the univariate analyses, a multivariate analysis of variance was conducted.

The data from the network analysis were first analyzed through Richards (1975) NEGOPY program. This yielded the information necessary for computation of the integration scores, which were then further analyzed.

Analyses of covariance were computed to partial out the effects of several possible confounding variables. These variables included: intelligence, degree of disability, physical attractiveness, speech skills, and race. Power and effect sizes were also computed for all hypothesis tests.

## RESULTS

Preliminary Analyses

Means, standard deviations and cell sizes were computed on the dependent variables and may be found in Tables 1 and 2. The data are grouped according to conditions. Half of the conditions are not listed for the network measures (integration scores) because the network analysis was performed only in the mainstreamed classes.

Key dependent and independent variables were correlated using the Pearson r statistic. The correlation matrix is presented in Table 3. Significant correlations are noted.

Description of Variables

Each child was asked a series of six questions about their behavior. The question and the variables they were labeled are listed below:

| | |
|---|---|
| How much do you play with handicapped children at school? | Play-h |
| How much do you play with nonhandicapped children at school? | Play-nh |
| How much do you play with handicapped children at home? | Home-h |
| How much do you play with nonhandicapped children at home? | Home-nh |
| How much do you like handicapped children? | Like |
| Do you think you could play with handicapped children? | T-play |

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Insert Tables 1 & 2 Here

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Insert Table 3 here

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The variables play-h and play-nh must be expected to differ between mainstreamed and nonmainstreamed classes, so were not included in the analyses.

Multivariate Analysis

In order to determine the viability of examining the individual variables, a multivariate analysis of variance was performed. This analysis included Home-h, Home-nh, Like, T-play and the integration scores. The overall F significance levels indicate that all univariate analyses may be examined except

the grade x class interaction and the three way interaction.

Communication Patterns

Several variables were measured to ascertain communication patterns. Four of them were general variables (Play-h, Play-nh, Home-h and Home-nh) while another series were created through the more specific questions of the network analysis. The key variables of interest from the network procedure were the integrativeness scores. These scores were obtained from the questions pertaining to patterns at school (INT 2), patterns at home (INT 3) and a summary of all responses (INT 1). An integrativeness score was computed for each child by taking their sum link strength, dividing that by the number of reciprocated links, and dividing that difference by the mean link strength for that particular network. Scores greater than 1 indicated higher than average integration into the communication patterns, while scores lower than 1 showed less than average integration into the network.

Hypothesis 1 proposed some differences between nonmainstreamed and mainstreamed children in mixed contact outside the classroom. Since the measurement of "mixed" contact was difference for handicapped and nonhandicapped children, two different analyses were done. Main effects for class were proposed for handicapped children on Home-nh (playing with nonhandicapped children at home, after school) and for nonhandicapped children on Home-h (playing with handicapped children at home, after school). Neither of these were supported, as the F ratio for Home-nh was 2.665 ($df=1$, $p<.112$) and on Home-h was .204 ($df=1$, $p<.652$).

Relevant to these variables, hypothesis five suggested a class x grade interaction on Home-h for nonhandicapped children and on Home-nh for handicapped children. This was not supported.

Hypothesis two proposed a main effect for handicap on integration scores. This was not quite supported on INT 2, but was supported on the summary variable, INT 1($F=5.001, df=1, p<.027$), and on INT 3, the measurement of who children play with at home after school ($F=5.396, df=1, p<.02$). The probability level for INT 2 was close to an acceptable level of significance, however ($F=2.937, df=1, p<.089$).

Hypotheses three and four must be discarded, as no cliques or liaisons were identified by the network analyses. Hypothesis 5 posited cross-sectional changes on the integration scores. This was not supposted, as all F values were <1. Power and effect size for all hypothesis tests are reported in Table 4.

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Insert Table 4 Here

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Analyses of Covariance

In order to control for possible confounding variables, several analyses of covariance were performed. The variables of intelligence, degree of disability, race, speech and physical attractiveness were covaried out of the integration scores. Main effects and interactions remain the same in all of the analyses. Based upon the significance level of the covariates, however, race seems to influence communication patterns, and both speech skills and physical attractiveness influence interaction networks after school.

Additional Variables

One other integration measure and two other questions from the General Information Questionnaire were asked to add insight to the process. INT 4 measured responses to the question "Do you like this child?" "Do you like handicapped children?" created the variable Like and "Do you think you could play with handicapped children?" yielded T-play. The analysis of INT 4 yielded no significant differences, although it did show an almost significant main effect for handicap ($F=2.945$, $df=1$, $p<.088$). The analysis of Like demonstrated a near main effect for handicap ($F=3.184$, $df=1$, $p<.076$) and class x grade interaction ($F=2.492$, $df=2$, $p<.085$), as well as a significant three-way interaction ($F=3.680$, $df=2$, $p<.027$). The interactions should not be examined, however, because the F ratios from the MANOVA on these interactions were not significant.

Analysis of T-play shows two main effects from the ANOVA: for handicap ($F=8.978$, $df=1$, $p<.003$) and a nearly significant one for class ($F=3.499$, $df=1$, $p<.063$). There were no significant interactions.

LSD multiple comparison tests for Like and T-play reveal that the key differences seem to come from nonhandicapped, sixth graders, who were more equivocal on their responses. This is particularly true with the nonmainstreamed, nonhandicapped sixth graders.

## DISCUSSION

The purpose of this research was to test six hypotheses about the social effectiveness of mainstreaming orthopedically handicapped children. This section will interpret and discuss the results reported above. The discussion will center on implications and generalizability of the findings. Some

tentative prescriptions for improving mainstreaming programs will be offered.

Review of Hypotheses

Hypothesis 1 examined the effects of mainstreaming on mixed contact scores outside the classroom:

> The mainstreamed children will be more likely to participate in mixed contact outside the classroom than will nonmainstreamed children.

The hypothesis referred to the fact that handicapped, mainstreamed kids should have more out-of-class contact with nonhandicapped kids than handicapped, nonmainstreamed kids. We also expected nonhandicapped, mainstreamed kids to have more contact with handicapped kids after school than nonhandicapped, nonmainstreamed children. However, the results show that mainstreaming is associated with differences among the handicapped kids, but does not affect nonhandicapped kids. Mainstreaming does not make nonhandicapped kids more likely to experience mixed contact outside the classroom. Handicapped, mainstreamed kids, however, engage in more mixed contact than handicapped kids who are not mainstreamed.

Even within mainstreamed classrooms, the handicapped children may not always be a part of the mainstream of activity. As stated in hypothesis 2:

> Within mainstreamed classrooms, the handicapped children will be less integrated into the social structure than will nonhandicapped children.

Results were computed from three integration scores: school scores, after school scores; and overall scores. The hypothesis was not supoorted by comparing the school scores, but was significantly supported on the overall and after school scores. When a sub-sample of the data were analyzed to equalize cell sizes all three integration scores yielded significant differences. We

have moderate justification for concluding that handicapped kids are less integrated into the social structure than their nonhandicapped cohorts.

Hypotheses 3 and 4 could not be tested because no cliques or liaisons were identified by the network analysis. This lack of sensitivity in the analysis appears to be caused by the small sizes of the networks (about 20 people per classroom).

Hypothesis 5 posited changes in integration scores across time (cross-sectionally):

> Scores for mixed contact among mainstreamed children will be significantly higher for older children than for younger children.

Results did not support this hypothesis. Since the probability levels of the three integration scores ranged from .969 to .993, there appears to be little trend in any direction. Mainstreaming does not seem to have any differential effects on various grade levels.

Hypothesis 6 suggested a grade by class interaction on the integration scores:

> The differences between mainstreamed and nonmainstreamed children on mixed contact will increase significantly as a function of age.

There was no interaction between mainstreaming and grade--no differential effects associated with mainstreaming across time. Hypothesis 6, then, was not supported by the results.

Mainstreaming

Overall, our handicapped subjects were less integrated into the social network of their classrooms than their nonhandicapped peers. In another test of this, analysis of home-h indicated that mainstreamed handicapped children are

more likely to play with nonhandicapped kids at home, even though the children they play with may not be in their class. In this section the findings relevant to the consequences of mainstreaming will be discussed.

The analysis of the data suggested that mainstreaming, if it has any social consequences at all, affects handicapped children more than nonhandicapped children. This conclusion is warranted by the analysis of mixed contact scores of the handicapped and nonhandicapped children. While mainstreamed handicapped kids experienced more mixed contact than those who are not mainstreamed, this finding did not hold true with nonhandicapped children. Nonhandicapped mainstreamed children were no more likely than their nonmainstreamed counterparts to participate in mixed contact outside the classroom. Although proponents of mainstreaming had hoped that it would improve relations between the handicapped and nonhandicapped in the long run, these early results do not show such a trend. Since the number of handicapped children in each class is still small, such changes may still occur in the future.

None of the mixed contact or integration scores showed any changes cross-sectionally. We think this, also, is due to the newness of the mainstreaming program. After the children have become more accustomed to mainstreaming, it may be more comfortable for them. Developmental changes may be more likely when 6th graders are in their 6th year of mainstreaming and 1st graders in their first.

In addition, the current study sampled only elementary classrooms. There may well be less clique formation in the earlier grades. An examination of 7th through 12th grade classrooms may provide a better test of the integration hypothesis.

The finding that handicapped mainstreamed children are playing with nonhandicapped children other than their classmates after school also deserves some comment. It appears that one of two things may be happening: either handicapped children are acquiring more confidence as a result of mainstreaming and seeking these children out, or the handicapped children are becoming more socially skillful, making them appear more attractive to nonhandicapped children. Since other results (Thompson, 1980) indicate that changes in social skills as a result of mainstreaming are only slight, it may be that the children are acquiring increased confidence: another goal of mainstreaming.

## Methodological Issues

Several methodological issues are also of concern in the interpretation of this research. The two basic questions are those of validity and generalizability. Issues relevant to validity will include strengths and problems with measuring instruments, stimuli material, and reliability issues. Limitations to generalizability will include: the small cell frequencies, unequal groups, variance accounted for, and aspects of this particular mainstreaming program which may limit the generalizability of the findings to other programs.

## Validity

Validity of the dependent variables must first be considered. Did the measurement procedure validly assess the communication networks of the children at play and recess time? Our observations were basically consistent with the self-reports of the children--children who reported active play time were more active and children who reported fewer contacts had fewer contacts. While a more thorough investigation would include more systematic observing and

recording of patterns, the children we observed were basically open and honest in their replies. If they disliked a child, they usually reported it. The fact that they willingly reported not playing with some children lends face validity to the findings. The basic problem with the network analysis seems to be that it was not sufficiently sensitive enough to differentiate cliques on the basis of degree of contact, assuming such cliques do exist. Our findings must be considered in light of this measurement problem. Our data and future data might benefit from analysis by other network procedures.

An additional problem with the measurement procedure was the use of one-item measuring instruments. Only one question was used to assess variables such as home-h and home-nh. While this procedure was appropriate for this study, it does present a problem with the assessment of reliability. It is not possible to statistically estimate the reliability of one-item measures. These measures were necessary in the current study because the testing procedure was already taking as long as the attention-span of the child would allow. For future research, however, it would be desirable to supplement these questions with additional items.

Generalizability

Taking into consideration some of the issues mentioned above, there are several other variables that may influence the generalizability of the findings. The mainstreaming program is very new, and the results may be different when it has functioned for several years. The school district is also in the midst of a court-ordered busing program, which may have a confounding effect.

More importantly, this particular program does not constitute mainstreaming in its least restrictive sense. In this district almost all of the children who are mainstreamed are placed into one school. Children are bused from their homes to a school at the northern edge of the district. Although the busing is necessary for pragmatic and political reasons it is producing negative social conditions for handicapped children who are living long distances from the other children in the class (most of whom are not bused). Participation in after-school networks is, therefore, very difficult. Because of the restrictions caused by the busing, many of the handicapped children also have to leave school 30 to 45 minutes early each day, lessening the time the children spent at school and in contact with their peers and isolating them somewhat from children in the class. If some or all of these problems were eliminated, the mainstreaming program might be more socially effective.

Another issue affecting generalizability could be the small sample sizes used for some of our comparisons. All handicapped children in the county-wide district were included in the original sample of children, but the strict requirements we established for selection of subjects narrowed the available pool of subjects considerably. However, since most results of this study were based on comparisons between two groups rather than an individual treatment group this probably did not affect outcomes substantially.

Additionally, since the independent variables were measured rather than randomly assigned, statements about causality must be made cautiously. Unforeseen and unanalyzed differences between the groups are always a possibility in such situations.

The final issue relevant to generalizability has to do with the size of the effects found in this study. The three integration scores had R2s of .0 to .04. This indicates that the amount of variance which could be explained by the integration scores was quite small. While this makes us cautious about generalizing our results, the low power of these tests provides more confidence that the results which were significant are, in fact, meaningful.

Recommendations

Three basic recommendations will be made: 1) changes in the mainstreaming program; 2) guides for the behavior of the teachers; and 3) training in handicap-simulation for nonhandicapped children in mainstreamed classrooms.

The mainstreaming program appears to be somewhat effective for handicapped children, but it has little impact on nonhandicapped children. Within the schools, more informal instruction by teachers and aides could be utilized to increase knowledge levels. Teachers should explain the causes of and effects of different types of limitations, and they could do it matter-of-factly, during conversation. Many of our subjects expressed some understanding of the effect of a specific disability, but could not adapt to other handicaps. "Mainstreaming" of handicapped children should also begin as early as possible. Since children acquire prerequisite communicative skills long before school age, mainstreaming must start earlier. Most handicapped children have little, if any, contact with peers outside of siblings in the first few years of life. The purpose of mainstreaming young handicapped children should be to provide as much contact as possible and thus avoid sheltering the handicapped child. If mainstreaming is to be effective, it must represent a larger segment of life-long experiences.

The attitude of the teacher is also an important variable. In conversation, many teachers reported that "some other teachers" resented the responsibility of mainstreaming. After being told for many years that special education teachers could do something that they couldn't, they are now told that they can do it too. Resentment or discomfort felt by teachers may easily be perceived by students. Although teachers already receive some in-service training to facilitate the transition, more would be appropriate.

Training in taking the perspective of the handicapped child may also prove helpful in mainstreaming programs. Wilson (1971) has developed a handicap simulation method that may prove beneficial as a part of training for children. This procedure asks children to pretend that they are blind, hearing-impaired, or unable to walk, and has shown some success in improving the empathy of nonhandicapped children for the handicapped. While the research has examined only short term effects, methods of permanently improving empathy toward the handicapped certainly warrants further investigation.

Future Research

The current study should be extended and expanded into new areas. Extensions of the methods should explore the preschool day care programs for the handicapped which are now beginning, and it should examine relationships beyond the sixth grade. Older mainstreaming programs should be examined, along with a longitudinal study of the current one. The careful study of changes that occur over time should be most enlightening. Also, the application of a more sensitive network analysis procedure would enable us to more validly test the integration hypotheses. This may be possible by either a recoding of the data or the use of another computer program to assess cliques and liaisons.

## CONCLUSION

The overriding goal of mainstreaming is to provide an opportunity for a life close to that of any other child (Turnbull and Turnbull, 1978). Coordinated with this are the goals of realization of personal worth and acquisition of the ability to communicate effectively with others (Newberger, 1978). The results of the present study indicate that changes need to be made before mainstreaming actually places handicapped children in the "mainstream" of activity. They are not communicated with as often as most children in the classes. Since contact with peers is important for the development of communication skills (Hartup, 1978) this lack of interaction may be having negative effects on the children. The long term consequences of the mainstreaming program must now be investigated.

## ENDNOTES

[1]This article is a partial report of the author's doctoral dissertation, completed at _____ University under _____. The pilot work for the research was funded by a _____ University Biomedical Research Grant, while the study reported herein was funded by Grant No. _____ from the Bureau for Education of the Handicapped.

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[2]A nonorthogonal analysis was necessary for both the multivariate and univariate ANOVAs because of the unequal cell sizes (Overall and Klett, 1972).

| Condition | Do you play with handicapped children at home? | Do you play with nonhandicapped children at home? | Do you think you could play with handicapped children? | Do you like handicapped children? |
|---|---|---|---|---|
| First grade, nonmainstreamed, handicapped | n=8<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=8<br>$\bar{x}$=1.8750<br>S.D.=1.2464 | n=8<br>$\bar{x}$=1.1250<br>S.D.=.3536 | n=8<br>$\bar{x}$=1.1250<br>S.D.=.3536 |
| First grade, nonmainstreamed, nonhandicapped | n=25<br>$\bar{x}$=3.5200<br>S.D.=.7141 | n=25<br>$\bar{x}$=3.4400<br>S.D.=.6506 | n=25<br>$\bar{x}$=1.5600<br>S.D.=.9609 | n=25<br>$\bar{x}$=1.4800<br>S.D.=.8226 |
| First grade, mainstreamed, handicapped | n=4<br>$\bar{x}$=3.5000<br>S.D.=.5774 | n=4<br>$\bar{x}$=3.7500<br>S.D.=.5000 | n=4<br>$\bar{x}$=1.5000<br>S.D.=1.7321 | n=4<br>$\bar{x}$=.7500<br>S.D.=.5000 |
| First grade, mainstreamed, nonhandicapped | n=44<br>$\bar{x}$=3.6951<br>S.D.=.7453 | n=44<br>$\bar{x}$=3.7727<br>S.D.=.6773 | n=44<br>$\bar{x}$=1.3864<br>S.D.=.8413 | n=44<br>$\bar{x}$=1.6136<br>S.D.=1.0613 |
| Third grade, nonmainstreamed, handicapped | n=7<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=7<br>$\bar{x}$=3.0000<br>S.D.=1.4142 | n=7<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=7<br>$\bar{x}$=1.1429<br>S.D.=.3780 |
| Third grade, nonmainstreamed, nonhandicapped | n=25<br>$\bar{x}$=3.5600<br>S.D.=.6506 | n=25<br>$\bar{x}$=3.2800<br>S.D.=.7916 | n=25<br>$\bar{x}$=1.8000<br>S.D.=1.2247 | n=25<br>$\bar{x}$=1.1600<br>S.D.=.6925 |

Key: 1=not at all 2=a little 3=some 4=a lot

Key: 1=yes 2=no 0=No response

Table 1

Means and Standard Deviations from General Information Questionnaire

| Condition | Do you play with handicapped children at home? | Do you play with nonhandicapped children at home? | Do you think you could play with handicapped children? | Do you like handicapped children? |
|---|---|---|---|---|
| Third grade, mainstreamed, handicapped | n=4<br>$\bar{x}$=3.7500<br>S.D.=.5000 | n=4<br>$\bar{x}$=2.2500<br>S.D.=1.5000 | n=4<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=4<br>$\bar{x}$=1.0000<br>S.D.=.0000 |
| Third grade, mainstreamed, nonhandicapped | n=69<br>$\bar{x}$=3.4638<br>S.D.=.9789 | n=69<br>$\bar{x}$=3.3623<br>S.D.=1.1242 | n=69<br>$\bar{x}$=1.3043<br>S.D.=.9287 | n=69<br>$\bar{x}$=1.4203<br>S.D.=1.0489 |
| Sixth grade, nonmainstreamed, handicapped | n=7<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=7<br>$\bar{x}$=3.2857<br>S.D.=.7559 | n=7<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=7<br>$\bar{x}$=1.0000<br>S.D.=.0000 |
| Sixth grade, nonmainstreamed, nonhandicapped | n=15<br>$\bar{x}$=3.4286<br>S.D.=.9376 | n=15<br>$\bar{x}$=2.7857<br>S.D.=1.1217 | n=15<br>$\bar{x}$=2.0714<br>S.D.=1.4917 | n=15<br>$\bar{x}$=2.2143<br>S.D.=1.4769 |
| Sixth grade, mainstreamed, handicapped | n=5<br>$\bar{x}$=3.4000<br>S.D.=.8944 | n=5<br>$\bar{x}$=3.0000<br>S.D.=1.0000 | n=5<br>$\bar{x}$=1.0000<br>S.D.=.0000 | n=5<br>$\bar{x}$=1.6000<br>S.D.=.8944 |
| Sixth grade, mainstreamed, nonhandicapped | n=39<br>$\bar{x}$=3.6667<br>S.D.=.5744 | n=39<br>$\bar{x}$=3.7179<br>S.D.=.7236 | n=39<br>$\bar{x}$=1.8718<br>S.D.=1.2613 | n=39<br>$\bar{x}$=1.6154<br>S.D.=1.2272 |
| GRAND | n=251<br>$\bar{x}$=3.3070<br>S.D.=1.0460 | n=251<br>$\bar{x}$=3.3785<br>S.D.=.9941 | n=251<br>$\bar{x}$=1.4940<br>S.D.=1.0368 | n=251<br>$\bar{x}$=1.4661<br>S.D.=1.0168 |

Table 1 (continued)

Table 2

Means and standard deviations of
Integration Scores

| Condition | Overall Integration | Integration at School | Integration at Home |
|---|---|---|---|
| First grade, mainstreamed, handicapped | n=4<br>$\bar{x}$=.8650<br>S.D.=.1902 | n=4<br>$\bar{x}$=.8655<br>S.D.=.0487 | n=4<br>$\bar{x}$=.8793<br>S.D.=.5047 |
| First grade, mainstreamed, nonhandicapped | n=41<br>$\bar{x}$=1.0190<br>S.D.=.2668 | n=41<br>$\bar{x}$=1.0233<br>S.D.=.2418 | n=41<br>$\bar{x}$=1.0151<br>S.D.=.4066 |
| Third grade, mainstreamed, handicapped | n=4<br>$\bar{x}$=.8650<br>S.D.=.1588 | n=4<br>$\bar{x}$=.8875<br>S.D.=.2236 | n=4<br>$\bar{x}$=.8793<br>S.D.=.5047 |
| Third grade, mainstreamed, nonhandicapped | n=68<br>$\bar{x}$=1.0158<br>S.D.=.2203 | n=68<br>$\bar{x}$=1.0155<br>S.D.=.2545 | n=68<br>$\bar{x}$=1.0151<br>S.D.=.4066 |
| Sixth grade, mainstreamed, handicapped | n=5<br>$\bar{x}$=.9104<br>S.D.=.1506 | n=5<br>$\bar{x}$=.9333<br>S.D.=.1654 | n=5<br>$\bar{x}$=.8485<br>S.D.=.1670 |
| Sixth grade, mainstreamed, nonhandicapped | n=36<br>$\bar{x}$=1.0012<br>S.D.=.1495 | n=36<br>$\bar{x}$=.9972<br>S.D.=.1894 | n=36<br>$\bar{x}$=1.0082<br>S.D.=.1939 |
| GRAND | n=157<br>$\bar{x}$=1.0027<br>S.D.=.2170 | n=157<br>$\bar{x}$=1.0042<br>S.D.=.2313 | n=157<br>$\bar{x}$=1.0001<br>S.D.=.2873 |

Scores greater than 1 indicate higher than average integration, scores lower than 1 indicate less than average integration.

| | Age | Grade | Degree | Speech | Attract | IQ | Play h |
|---|---|---|---|---|---|---|---|
| Age | 1.0000 | .9324** | .1279 | -.1275 | .0509 | -.2846** | -.0038 |
| Grade | | 1.0000 | .0262 | -.1814* | .0476 | -.2028* | -.0469 |
| Degree of Dis. | | | 1.0000 | .4263** | .3983** | -.3076** | .6170** |
| Speech | | | | 1.0000 | .2620** | -.3069** | .2358** |
| Attract | | | | | 1.0000 | -.1322 | .1925* |
| IQ | | | | | | 1.0000 | -.3723** |
| Play h | | | | | | | 1.0000 |

Table 3

Intercorrelation Matrix of Variables

| | Play nh | Home h | Home nh | Like | T-play |
|---|---|---|---|---|---|
| Age | -.0836 | -.0466 | -.0643 | .1990* | .1024 |
| Grade | -.1258 | -.1022 | -.0356 | .1797* | .1201 |
| Degree of Dis. | .0188 | -.6046** | -.2651** | -.1860* | -.2755** |
| Speech | .0255 | -.3886** | -.3316** | -.0402 | -.0714 |
| Attract | -.0778 | -.3560** | -.1006 | -.1325 | -.1409 |
| IQ | .0294 | .2521** | .1-38 | -.0015 | .1940* |
| Play h | .0680 | -.4976** | .0247 | -.2394** | -.2562** |
| Play nh | 1.0000 | .0451 | -.0171 | -.1201 | -.1585* |
| Home h | | 1.0000 | .3555** | .1344 | .2159** |
| Home nh | | | 1.0000 | -.0092 | .0665 |
| Like | | | | 1.0000 | .1423 |
| T-play | | | | | 1.0000 |

*p < .05
**p < .01

Table 3 (cont.)

TABLE 4

Tests of Hypotheses

| Hypothesis | Effect | Variable | Effect Size (f) | Power |
|---|---|---|---|---|
| H1 | class | home-h | .314 | .68 |
| | | home-nh | .204 | .05 |
| H2 | handicap | INT1 | .204 | .05 |
| | | INT2 | .152 | .24 |
| | | INT3 | .204 | .05 |
| | | T-play | .152 | .04 |
| H3 | ——— | | | |
| H4 | ——— | | | |
| H5 | grade | INT1 | .002 | .001 |
| | | INT2 | .007 | .002 |
| | | INT3 | .002 | .001 |
| H6 | grade by class | home-h | .450 | .80 |
| | | home-nh | .258 | .38 |

*Effect sizes are based on r(mult) values and are estimated from the f values given in Tables by Cohen (1977). Power values are also estimated from Cohen's tables.

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